OCAP ACTION summary: Master Matrix

#	BO/Take permit	Action Title	Objective	Action	Responsible Agency	Lead	Due date	Status Thru Water Year 2010
1	NMFS	11.2.1.1	Procedures	Technical teams	USBR	USBR	Immediately	Work groups established through the 5-Agency Team
2	NMFS	11.2.1.2	Research and Adaptive Mtg.	CALFED workshop	USBR/NMFS/ CALFED		11/30/2009	USBR prepared key operating objectives information for workshop
3	NMFS	11.2.1.3	Monitoring and Reporting Requirements	funding existing programs CV steelhead	USBR/DWR		Ongoing thru 2030	Required fish monitoring is being addressed through 5-Agencies/IMT. The link to DWRs BDO is the monitoring required for the Temporary Barriers which is underway
4	NMFS	11.2.1.3	Monitoring and Reporting Requirements	Reclamation and DWR shall ensure that all monitoring programs regarding the effects of CVP and SWP operations and which result in the direct take of winter-run, spring-run, CV steelhead, or Southern DPS of green sturgeon, are conducted by a person or entity that has been authorized by NMFS. Reclamation and DWR shall establish a contact person to coordinate these activities with NMFS.	DWR/USBR		Ongoing thru 2030	Coordination is ongoing; monitoring programs being developed and funded through agencies for listed species.
5	NMFS	11.2.1.3	Monitoring and Reporting Requirements	Reclamation and DWR shall submit weekly reports to the interagency Data Assessment Team (DAT) regarding the results of monitoring and incidental take of winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon associated with operations of project facilities.	DWR/USBR		Ongoing thru 2030	DWR developing weekly reports; coordination ongoing
6	NMFS	11.2.1.3	Monitoring and Reporting Requirements	Reclamation and DWR shall submit weekly DAT reports and an annual written report to NMFS describing the results of real-time monitoring of winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon associated with operations of the DCC and CVP and SWP Delta pumping facilities, and other Division level operations authorized through this RPA.	DWR/USBR		Ongoing thru 2030	DWR/USBR preparing operations reports
7	NMFS	11.2.1.3	Monitoring and Reporting Requirements	Reclamation and DWR shall jointly fund these monitoring locations for the duration of the Opinion (through 2030) to ensure compliance with the RPA and assess the performance of the RPA actions. a) Upstream: Adult escapement and juvenile monitoring for spring-run, winter-run, and steelhead on the Sacramento River, American River, Feather River, Clear Creek, Mill Creek, Deer Creek and Battle Creek. c) Sacramento River new juvenile monitoring station: The exact location to be determined, between RBDD and Knights Landing. d) Delta: Continuation of the following monitoring stations that are part of the IEP: Chipps Island Trawl, Sacramento Trawl, Knights Landings RST, and beach seining program. Additionally, assist in funding new studies to determine green sturgeon relative abundance and habitat use in the Delta. e) San Joaquin River monitoring shall include: Adult escapement and juvenile monitoring for steelhead on the Stanislaus River; Mossdale Kodiak Trawling to determine steelhead smolt passage; steelhead survival studies	DWR/USBR		Ongoing thru 2030	Coordination is ongoing on prioritizing monitoring needs and funding sources.
8	NMFS	I.1.1 Spring Attraction Flows	Encourage spring-run movement to upstream Clear Creek habitat for spawning.	Reclamation shall annually conduct at least two pulse flows in Clear Creek in May and June of at least 600 cfs for at least three days for each pulse, to attract adult spring-run holding in the Sacramento River main stem. This may be done in conjunction with channel-maintenance flows (Action I.1.2).	USBR	USBR		Two pulse flows provided in water year 2010; flows unsuccessful in attracting spring-run Chinook; Coordination ongoing
9	NMFS	I.1.2. Channel Maintenance Flows	Minimize project effects by enhancing and maintain previously degraded spawning habitat for spring-run and CV steelhead	Reclamation shall re-operate Whiskeytown Glory Hole spills during the winter and spring to produce channel maintenance flows of a minimum of 3,250 cfs mean daily spill from Whiskeytown for one day, to occur seven times in a ten-year period, unless flood control operations provide similar releases. Re-operation of Whiskeytown Dam should be implemented with other project facilities as described in the EWP Pilot Program (Reclamation 2008d)	USBR	USBR		Coordination is ongoing; clarification needed regarding actions and consistency with EWP Pilot Program.
10	NMFS	I.1.3. Spawning Gravel Augmentation	Enhance and maintain previously degraded spawning habitat for spring-run and CV steelhead.	Reclamation, in coordination with the Clear Creek Technical team, shall continue spawning gravel augmentation efforts. By **December 31** each year, Reclamation shall provide a report to NMFS on implementation and effectiveness of the gravel augmentation program.	USBR	USBR	12/31/2009	Efforts ane ongoing; Gravel augmentation for 2009 and 2010 water year successful in creating suitable habitat for spring-run Chinook.
11	NMFS	I.1.4. Spring Creek Temperature Control Curtain (Note: This action benefits Sacramento River conditions, but is part of Clear Creek operations)	Reduce adverse impacts of project operations on water temperature for listed salmonids in the Sacramento River.	Reclamation shall replace the Spring Creek Temperature Control Curtain in Whiskeytown Lake by **June 2011**	USBR	USBR	6/1/2011	Contract awarded Sep 2010 and new curtain installation estimated completion is June 2011.

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12	NMFS	I.1.5. Thermal Stress Reduction	To reduce thermal stress to over-summering steelhead and spring-run during holding, spawning, and embryo incubation.	Reclamation shall manage Whiskeytown releases to meet a daily water temperature of: 1) 60 °F at the Igo gage from **June 1 through September 15**; and 2) 56°F at the Igo gage from **September 15 to October 31**. Reclamation, in coordination with NMFS, will assess improvements to modeling water temperatures in Clear Creek and identify a schedule for making improvements.	USBR	USBR		Coordination is ongoing; potential issues with temperature control and Whiskeytown cold water pool or temperature releases to Clear Creek.
13	NMFS	I.1.6. Adaptively Manage to Habitat Suitability/IFIM Study Results	Decrease risk to Clear Creek spring-run and CV steelhead population through improved flow management designed to implement state-of-the-art scientific analysis on habitat suitability.	Reclamation shall operate Whiskeytown Reservoir as described in the Project Description with the modifications described in Action I.1 until **September 30, 2012**, or until 6 months after current Clear Creek salmonids habitat suitability (e.g., IFIM) studies are completed, whichever occurs later.When the salmonid habitat suitability studies are completed, Reclamation will, in conjunction with the CCTWG, assess whether Clear Creek flows shall be further adapted to reduce adverse impacts on spring-run and CV steelhead, and report their findings and proposed operational flows to NMFS within 6 months of completion of the studies.	USBR	USBR	12/30/2012	Coordination is ongoing with NMFS and CCTWG and coordination of IFIM studies and reports on Clear Creek flow schedules for spring-run Chinook and steelhead.
14	NMFS	1.2.1 Performance Measures.	To establish and operate to a set of performance measures for temperature compliance points and End-of-September (EOS) carryover storage, enabling Reclamation and NMFS to assess the effectiveness of this suite of actions over time. Performance measures will help to ensure that the beneficial variability of the system from changes in hydrology will be measured and maintained.	The following long-term performance measures shall be attained. Reclamation shall track performance and report to NMFS at least every 5 years. If there is significant deviation from these performance measures over a 10-year period, measured as a running average, which is not explained by hydrological cycle factors (e.g., extended drought), then Reclamation shall reinitiate consultation with NMFS. Performance measures for EOS carryover storage at Shasta Reservoir: • 87 percent of years: Minimum EOS storage of 2.2 MAF • 82 percent of years: Minimum EOS storage of 2.2 MAF and end-of-April storage of 3.8 MAF in following year (to maintain potential to meet Balls Ferry compliance point) • 40 percent of years: Minimum EOS storage 3.2 MAF (to maintain potential to meet Jelly's Ferry compliance point in following year). Measured as a 10-year running average, performance measures for temperature compliance points during summer season shall be: • Meet Clear Creek Compliance point 95 percent of time • Meet Balls Ferry Compliance point 85 percent of time • Meet Jelly's Ferry Compliance point 40 percent of time • Meet Bend Bridge Compliance point 15 percent of time	USBR	USBR		Coordination is ongoing; Using Shasta mass balance tool and end of April storage/ temperature potential "rule of thumb" graph to estimate operations to meet the RPA criteria.
15	NMFS	I.2.2. November through February Keswick Release Schedule (Fall Actions)	Minimize impacts to listed species and naturally spawning non-listed fall-run from high water temperatures by implementing standard procedures for release of cold water from Shasta Reservoir.	Depending on EOS carryover storage and hydrology, Reclamation shall develop and implement a Keswick release schedule, and reduce deliveries and exports as detailed below.	USBR	USBR		Coordination is ongoing.
16	NMFS	I.2.2.A Implementation Procedures for EOS Storage at 2.4 MAF and Above		If the EOS storage is at 2.4 MAF or above, by **October 15**, Reclamation shall convene a group including NMFS, USFWS, and CDFG, through B2IT or other comparable process, to consider a range of fall actions. A written monthly average Keswick release schedule shall be developed and submitted to NMFS by **November 1** of each year, based on the criteria below. The monthly release schedule shall be tracked through the work group.	USBR	USBR		Coordination is ongoing.
17	NMFS	I.2.2.B Implementation Procedures for EOS Storage Above 1.9 MAF and Below 2.4 MAF		If EOS storage is between 1.9 and 2.4 MAF, then Reclamation shall convene a group including NMFS, USFWS, and CDFG, through B2IT or other comparable workgroup, to consider a range of fall actions. Reclamation shall provide NMFS and the work group with storage projections based on 50 percent, 70 percent, and 90 percent hydrology through February, and develop a monthly average Keswick release schedule based on the criteria below. The monthly release schedule shall be submitted to NMFS by **November 1**.	USBR	USBR		Need additional clarification from NMFS on compliance points - Reclamation developed exceedence plots for 50%, 70% and 90% hydrology.
18	NMFS	I.2.2.C. Implementation and Exception Procedures for EOS Storage of 1.9 MAF or Below		If the EOS storage is at or below 1.9 MAF, then Reclamation shall: 1) **In early October**, reduce Keswick releases to 3,250 cfs as soon as possible, unless higher releases are necessary to meet temperature compliance points (see action I.2.3). 2) Starting **in early October,** if cool weather prevails and temperature control does not mandate higher flows, curtail discretionary water deliveries (including, but not limited to agricultural rice decomposition deliveries) to the extent that these do not coincide with temperature management for the species.	USBR/DWR	USBR		Coordination is ongoing
19	NMFS	I.2.3. February Forecast; March – May 14 Keswick Release Schedule (Spring Actions)	To conserve water in Shasta Reservoir in the spring in order to provide sufficient water to reduce adverse effects of high water temperature in the summer months for winter-run, without sacrificing carryover storage in the fall.	1) Reclamation shall make its **February 15** forecast of deliverable water based on an estimate of precipitation and runoff within the Sacramento River basin at least as conservative as the 90 percent probability of exceedence. Subsequent updates of water delivery commitments must be based on monthly forecasts at least as conservative as the 90 percent probability of exceedence. 2) Reclamation shall make releases to maintain a temperature compliance point not in excess of 56 degrees between Balls Ferry and Bend Bridge from **April 15 through May 15**.	USBR	USBR		Coordination is ongoing-temperature target met.
20	NMFS	I.2.3.A Implementation Procedures if February Forecast, Based on 90 Percent Hydrology, Shows that Balls Ferry Temperature Compliance Point and 2.2 MAF EOS are Both Achievable		NMFS will review the draft February forecast to determine whether both a temperature compliance point at Balls Ferry during the temperature control season (**May – October**), and EOS storage of at least 2.2 MAF, is likely to be achieved. If both are likely, then Reclamation shall announce allocations and operate Keswick releases in **March, April, and May** consistent with its standard plan of operation. Preparation of a separate Keswick release schedule is not necessary in these circumstances.	NMFS	NMFS		Coordination is ongoing-temperature target met.

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21	NMFS	I.2.3.B Implementation Procedures if February Forecast, Based on 90 Percent Hydrology, Shows that Only Balls Ferry Compliance or 2.2 MAF EOS, but Not Both, Is Achievable		1) On or before **February 15**, Reclamation shall reduce Keswick releases to 3,250 cfs, unless NMFS concurs on an alternative release schedule. This reduction shall be maintained until a flow schedule is developed per procedures below. 2) In coordination with NMFS, by **March 1**, Reclamation shall develop an initial monthly Keswick release schedule, based on varying hydrology of 50 percent, 70 percent, and 90 percent (similar in format to the fall and winter action implementation procedures – see table above). These schedules shall be used as guidance for monthly updates and consultations. 3) Based on this guidance, Reclamation shall consult with NMFS monthly on Keswick releases. Reclamation shall submit a projected forecast, including monthly average release schedules and temperature compliance point to NMFS every month, within 7 business days of receiving the DWR runoff projections for that month. Within 3 business days of receiving this information from Reclamation, NMFS will review the draft schedule for consistency with the criteria below and provide written recommendations to Reclamation. 4) The initial monthly Keswick release schedule, and subseq	USBR	USBR		Coordination is ongoing
22	NMFS	I. 2.3. C. Drought Exception Procedures if February Forecast, Based on 90 Percent Hydrology, Shows that Clear Creek Temperature Compliance Point or 1.9 MAF EOS Storage is Not Achievable		Reclamation shall follow all procedures immediately above (Action I.2.3.B) and, in addition, shall: 1) By **March 1**, provide a contingency plan with a written justification that all actions within Reclamation's authorities and discretion are being taken to preserve cold water at Shasta Reservoir for the protection of winter-run. 2) The contingency plan shall also, at a minimum, include the following assessments and actions: a) Relaxation of Wilkins Slough navigation criteria to at most 4,000 cfs. b) An assessment of any additional technological or operational measures that may be feasible and may increase the ability to manage the cold water pool. c) Notification to State Water Resources Control Board that meeting the biological needs of winter-run and the needs of resident species in the Delta, delivery of water to nondiscretionary Sacramento Settlement Contractors, and Delta outflow requirements per D-1641, may be in conflict in the coming season and requesting the Board's assistance in determining appropriate contingency measures, and exercising their authorities to put these measures in place. 3) If, during the temperature control season, a Clear Creek TCP on t achieved, then Reclamation shall bypass power at Shasta Dam if NMFS determines a bypass is necessary for preserving the cold water pool. This power by-pass may be necessary to maintain temperature controls for winter-run, or later in the temperature season, for spring-run.	USBR	USBR		Shasta EOS storage met
23	NMFS	1.2.4 May 15 Through October Keswick Release Schedule (Summer Action)	To manage the cold water storage within Shasta Reservoir and make cold water releases from Shasta Reservoir to provide suitable habitat temperatures for winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon in the Sacramento River between Keswick Dam and Bend Bridge, while retaining sufficient carryover storage to manage for next year's cohorts. To the extent feasible, manage for suitable temperatures for naturally spawning fall-run.	Reclamation shall develop and implement an annual Temperature Management Plan by May 15 to manage the cold water supply within Shasta Reservoir and make cold water releases from Shasta Reservoir and Spring Creek to provide suitable temperatures for listed species, and, when feasible, fall-run. Reclamation shall manage operations to achieve daily average water temperatures in the Sacramento River between Keswick Dam and Bend Bridge as follows: 1) Not in excess of 56°F at compliance locations between Balls Ferry and Bend Bridge from **May 15 through September 30** for protection of winter-run, and not in excess of 56°F at the same compliance locations between Balls Ferry and Bend Bridge from **October 1 through October 31** for protection of mainstem spring run, whenever possible. 2) Reclamation shall operate to a final Temperature Management Plan starting **May 15 and ending October 31**. 3) As part of the adaptive management process, and in coordination with NMFS, by **March 2010**, Reclamation shall fund an independent modeler to review these procedures and the recommendations of the Calfed Science Panel report on temperature management and recommend specific refinements to these procedures to achieve optimal temperature management, with due consideration of the Calfed Science panel's recommendations (Deas et al., 2009) regarding temperature management. Upon written concurrence of NMFS, refinements to the implementation procedures for this action suite, based on the independent contractor's report, may be adopted and implemented.	USBR	USBR	5/15/2010	Temperature management plan developed by Reclamation in May 2010 and approved by NMFS
24	NMFS	I.2.5. Winter-Run Passage and Re-Introduction Program at Shasta Dam	See Fish Passage Program, Action V					IFPSC formed in June 2010. Habitat subgroups formed in July 2010 with emphasis on near term actions.
25	NMFS	Action I.2.6. Restore Battle Creek for Winter-Run, Spring-Run, and CV Steelhead	To partially compensate for unavoidable adverse effects of project operations by restoring winter-run and spring-run to the Battle Creek watershed. A second population of winter-run would reduce the risk of extinction of the species from lost resiliency and increased vulnerability to catastrophic events.	Reclamation shall direct discretionary funds to implement the Battle Creek Salmon and Steelhead Restoration Project. Phase 1A funding is currently allocated through various partners and scheduled to commence in **Summer 2009** (Reclamation 2008c). DWR shall direct discretionary funds for Phase 1B and Phase 2, consistent with the proposed amended Delta Fish Agreement by **December 31** of each year, Reclamation and DWR will submit a written report to NMFS on the status of the project, including phases completed, funds expended, effectiveness of project actions, additional actions planned (including a schedule for further actions), and additional funds needed. The Battle Creek Salmon and Steelhead Restoration Project shall be completed no later than **2019**.	USBR/DWR	USBR	Annually to 2019	Coordination is ongoing; Phases 1A and 1B underway.

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26	NMFS	I.3.1. Operations after May 14, 2012: Operate RBDD with Gates Out		No later than **May 15, 2012**, Reclamation shall operate RBDD with gates out all year to allow unimpeded passage for listed anadromous fish. If the Red Bluff Alternative Intake Structure is not anticipated to be operational by **May 15, 2012**, Reclamation may submit a request to NMFS, no later than **January 31, 2012**, to close the gates from **June 15 to September 1, 2012**. This request must document that all milestones for construction of the alternative pumping plant have been met and that all other conservation measures (see below) have been implemented.	USBR	USBR	5/15/2012, 1/31/2012	Coordination is ongoing
27	NMFS	I.3.2. Interim Operations		Until **May 14, 2012**, Reclamation shall operate RBDD according to the following schedule: • **September 1 - June 14**: Gates open. No emergency closures of gates are allowed. • **June 15 - August 31**: Gates may be closed at Reclamation's discretion, if necessary to deliver water to TCCA.	USBR	USBR		Coordination is ongoing
28	NMFS	I.3.3. Interim Operation for Green Sturgeon	Allow passage of green sturgeon during interim operations.	When gates are in, Reclamation shall retain a minimum 18-inch opening under the gates that are open, to allow safe downstream passage of adult green sturgeon. The 18-inch opening may be modified to 12 inches by the RBDD technical team if necessary to maintain the structural integrity of the dam and/or adequate attraction flows for salmonids at the fish ladders, or in consideration of other real-time fish migratory issues.	USBR	USBR	6/15/2009	RBDD gates went in June 15, 2010 with 18 inch opening; Gates were then raised on August 20, 2010
29	NMFS	I.3.4: Measures to Compensate for Adverse Effects of Interim Operations on Green Sturgeon	Offset short-term effects to green sturgeon due to interim gate operations by investing in geographically specific research needed to determine green sturgeon life history and recovery needs.	Reclamation shall continue ongoing funded research to characterize green sturgeon populations in the upper Sacramento River Basin, their movements, and habitat usage, as planned through **fiscal year 2009**. In addition, Reclamation (or TCCA) shall convene a technical team, including representatives from NMFS, CDFG, USFWS, Corps, the University of California at Davis (UCD), and other cooperators, to review studies and results and coordinate research needs for green sturgeon. Reclamation and/or TCCA shall provide the necessary funding to insure that research will continue to be conducted in a coordinated and cooperative manner with the express intent of fully implementing the research projects described in the UCD proposal in Appendix 2-B to this Opinion.	USBR	USBR		Coordination is ongoing with agencies on green sturgeon research
30	NMFS	I.3.5. Measures to Compensate for Adverse Effects of Interim Operations on Spring-Run	Offset unavoidable short-term effects to spring-run from passage impediments of RBDD by restoring spring-run passage elsewhere in the Sacramento River system.	Reclamation shall provide $500,000 for implementation of spring- run passage improvement projects in the Sacramento River. Appendix 2-B describes specific projects that may be implemented. By **December 15, 2009**, Reclamation shall provide NMFS with a prioritized list of projects from Appendix 2-B and an implementation schedule. Reclamation shall provide an annual report to NMFS on implementation and effectiveness of projects. Reclamation shall monitor and maintain these projects for five years.	USBR/NMFS		12/15/2009	Coordination is ongoing
31	NMFS	I.4. Wilkins Slough Operations	Enhance the ability to manage temperatures for anadromous fish below Shasta Dam by operating Wilkins Slough in the manner that best conserves the dam's cold water pool for summer releases.	Reclamation shall convene the SRTTG to review past operational data, hydrology, and fisheries needs for Wilkins Slough. The SRTTG shall recommend Wilkins Slough minimum flows for anadromous fish in critically dry years, in lieu of the current 5,000 cfs navigation criterion. Recommendations shall be made to NMFS by **December 1, 2009**. The recommendations will be implemented upon NMFS' concurrence. In years other than critically dry years, the need for a variance from the 5,000 cfs navigation criterion will be considered during the process of developing the Keswick release schedules (Action I.2.2-4).	USBR	USBR	12/1/2009	Work team being developed for Wilkins Slough operations
32	NMFS	I.5. Funding for CVPIA Anadromous Fish Screen Program (AFSP)	To reduce entrainment of juvenile anadromous fish from unscreened diversions.	Reclamation shall screen priority diversions as identified in the CVPIA AFSP, consistent with previous funding levels for this program. In addition, Reclamation/CVPIA Program shall evaluate the potential to develop alternative screened intakes that allow diverters to withdraw water below surface levels required by the antiquated Wilkins Slough navigation requirement criterion of 5,000 cfs.	USBR	USBR		Coordination is ongoing
33	NMFS	I.6.1. Restoration of Floodplain Rearing Habitat	To restore floodplain rearing habitat for juvenile winter-run, spring-run, and CV steelhead in the lower Sacramento River basin. This objective may be achieved at the Yolo Bypass, and/or through actions in other suitable areas of the lower Sacramento River.	In cooperation with CDFG, USFWS, NMFS, and the Corps, Reclamation and DWR shall, to the maximum extent of their authorities (excluding condemnation authority), provide significantly increased acreage of seasonal floodplain rearing habitat, with biologically appropriate durations and magnitudes, from **December through April**, in the lower Sacramento River basin, on a return rate of approximately one to three years, depending on water year type. In the event that this action conflicts with Shasta Operations Actions I.2.1 to I.2.3, the Shasta Operations Actions shall prevail.	USBR/DWR	DWR	12/31/2011, 12/31/2013, 12/31/2016	Coordination is ongoing
34	NMFS	I.6.2. Near-Term Actions at Liberty Island/Lower Cache Slough and Lower Yolo Bypass		By **September 30, 2010**, Reclamation and/or DWR shall take all necessary steps to ensure that an enhancement plan is completed and implemented for Liberty Island/Lower Cache Slough, as described in Appendix 2-C. This action shall be monitored for the subsequent five years, at a minimum, to evaluate the use of the area by juvenile salmonids and to measure changes in growth rates. Interim monitoring reports shall be submitted to NMFS annually, by September 30 each year, and a final monitoring report shall be submitted on **September 30, 2015**, or in the fifth year following implementation of enhancement actions. NMFS will determine at that time whether modification of the action or additional monitoring is necessary to achieve or confirm the desired results. This action shall be designed to avoid stranding or migration barriers for juvenile salmon.	USBR/DWR	DWR	9/30/2010, then annually to 9/30/2015	DWR developed enhancement plan and submitted to NMFS on September 30, 2010
35	NMFS	I.6.3. Lower Putah Creek Enhancements		By **December 31, 2015**, Reclamation and/or DWR shall develop and implement Lower Putah Creek enhancements as described in Appendix 2-C, including stream realignment and floodplain restoration for fish passage improvement and multi-species habitat development on existing public lands. By **September 1** of each year, Reclamation and/or DWR shall submit to NMFS a progress report towards the successful implementation of this action. This action shall not result in stranding or migration barriers for juvenile salmon.	USBR/DWR	DWR	9/1/09, then annually to 12/31/2015	Coordination is ongoing

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36	NMFS	I.6.4. Improvements to Lisbon Weir		By **December 31, 2015**, Reclamation and/or DWR shall, to the maximum extent of their authorities, assure that improvements to the Lisbon Weir are made that are likely to achieve the fish and wildlife benefits described in Appendix 2-C. Improvements will include modification or replacement of Lisbon Weir, if necessary to achieve the desired benefits for fish. If neither Reclamation nor DWR has authority to make structural or operational modifications to the weir, they shall work with the owners and operators of the weir to make the desired improvements, including providing funding and technical assistance. By **September 1** of each year, Reclamation and/or DWR shall submit to NMFS a report on progress toward the successful implementation of this action. Reclamation and DWR must assure that this action does not result in migration barriers or stranding of juvenile salmon.	USBR/DWR	DWR	9/1/09, then annually to 12/31/2015	Coordination is ongoing
37	NMFS	I.7. Reduce Migratory Delays and Loss of Salmon, Steelhead, and Sturgeon at Fremont Weir and Other Structures in the Yolo Bypass	Reduce migratory delays and loss of adult and juvenile winter-run, spring-run, CV steelhead and Southern DPS of green sturgeon at Fremont Weir and other structures in the Yolo Bypass.	By **December 31, 2011**, as part of the plan described in Action I.6.1, Reclamation and/or DWR shall submit a plan to NMFS to provide for high quality, reliable migratory passage for Sacramento Basin adult and juvenile anadromous fishes through the Yolo Bypass. By **June 30, 2011**, Reclamation and/or DWR shall obtain NMFS concurrence and, to the maximum extent of their authorities, and in cooperation with other agencies and funding sources, begin implementation of the plan, including any physical modifications. By **September 30, 2009**, Reclamation shall request in writing that the Corps take necessary steps to alter Fremont Weir and/or any other facilities or operations requirements of the Sacramento River Flood Control Project or Yolo Bypass facility in order to provide fish passage and shall offer to enter into a Memorandum of Understanding, interagency agreement, or other similar mechanism, to provide technical assistance and funding for the necessary work. By J**une 30, 2010**, Reclamation shall provide a written report to NMFS on the status of its efforts to complete this action, in cooperation with the Corps, including milestones and timelines to complete pa Reclamation and/or DWR shall assess the performance of improved passage and flows through the bypass, to include an adult component for salmonids and sturgeon (i.e., at a minimum, acoustic receivers placed at the head and tail of the bypass to detect use by adults).	USBR/DWR	DWR	9/30/2009, 6/30/2010, 6/30/2011, 12/31/2011	DWR and Reclamation developed plan for Yolo Bypass and submitted to NMFS on September 30, 2010.
38	NMFS	II.1. Lower American River Flow Management	To provide minimum flows for all steelhead life stages.	Implement the flow schedule specified in the Water Forum's Flow Management Standard (FMS), which is summarized in Appendix 2-D of this Opinion. The FMS flow schedule has been developed by the Water Forum, Reclamation, USFWS, NMFS, and CDFG in order to establish required minimum flows for anadromous salmonids in the lower American River. The flow schedule specifies minimum flows and does not preclude Reclamation from making higher releases at Nimbus Dam. Reclamation shall ensure that flow, water temperature, steelhead spawning, and steelhead rearing monitoring is conducted annually in order to help inform the ARG process and to evaluate take associated with flow fluctuations and warm water temperatures. Steelhead monitoring surveys should follow the objectives and protocols specified in the FMS Monitoring and Evaluation Program relating to steelhead spawning and rearing.	USBR	USBR		Coordination is ongoing; Flows in the LAR have met/surpassed FMS minimum flow schedules; ARG convened to make recommendations for management within FMS constraints.
39	NMFS	II.2. Lower American River Temperature Management	Maintain suitable temperatures to support over-summer rearing of juvenile steelhead in the lower American River.	Each year, Reclamation shall prepare a draft Operations Forecast and Temperature Management Plan based on forecasted conditions and submit the draft Plan to NMFS for review by **May 1** of each year. The information provided in the Operations Forecast will be used in the development of the Temperature Plan. The draft plan shall contain: (1) forecasts of hydrology and storage; (2) a modeling run or runs, using these forecasts, demonstrating that the temperature compliance point can be attained (see Coldwater Management Pool Model approach in Appendix 2-D); (3) a plan of operation based on this modeling run that demonstrates that all other non-discretionary requirements are met; and (4) allocations for discretionary deliveries that conform to the plan of operation.	USBR	USBR	5/1/2010	Reclamation prepared operations forecast and Temperature Management Plan to NMFS in May 2010 addressing forecast of hydrology and storage and modeling information. Iterative model being developed for water temperature plan.
40	NMFS	II.3. Structural Improvements	Improve the ability to manage the cold water pool to provide suitable temperatures for listed fish through physical and structural improvements at the dams.	Reclamation shall evaluate physical and structural modifications that may improve temperature management capability, as detailed below. Upon completion of the evaluation, Reclamation shall select the most promising projects and shall submit, by **June 30th 2010**, a proposed plan to NMFS to implement selected projects. Reclamation shall seek NMFS' concurrence that the proposed projects are likely to be effective in reducing adverse effects of warm water temperatures on listed fish. With NMFS' concurrence, Reclamation shall implement selected projects by **December 15, 2012**. Modifying the following structures may substantially improve the ability to manage temperature in the Lower American River to reduce adverse effects of unsuitably warm water on listed species. The comparative benefits and costs of alternative modifications that will achieve objectives have not been fully analyzed. The objective of this action is to provide effective tools to make transparent temperature management decisions. Alternatives include decision impact analyses, regular analysis of a broad array of operational scenarios, improved operations group processes, and monitoring.	USBR	USBR	6/30/2010, 12/15/2012	Reclamation completed evaluation of alternatives and sent summary email to NMFS on 6/30/2010

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41	NMFS	II.4. Minimize Flow Fluctuation Effects	Reduce stranding and isolation of juvenile steelhead through ramping protocols.	The following flow fluctuation objectives shall be followed: 1) From **January 1 through May 30**, at flow levels <5,000 cfs, flow reductions shall not exceed more than 500 cfs/day and not more than 100 cfs per hour. 2) From **January 1 through May 30**, Reclamation shall coordinate with NMFS, CDFG, and USFWS to fund and implement monitoring in order to estimate the incidental take of salmonids associated with reductions in Nimbus Dam releases. 3) Minimize the occurrence of flows exceeding 4,000 cfs throughout the year, except as may be necessary for flood control or in response to natural high precipitation events.	USBR	USBR		Coordination in ongoing; flow objectives met
42	NMFS	II.5. Fish Passage at Nimbus and Folsom Dams	Provide access for steelhead to historic cold water habitat above Nimbus and Folsom dams.	See Fish Passage Program, Action V.	USBR	USBR		IFPSC formed in June 2010. Habitat subgroups formed in July 2010 with emphasis on near term actions.
43	NMFS	II.6.1. Preparation of Hatchery Genetic Management Plan (HGMP) for Steelhead		Reclamation shall fund CDFG to prepare a complete draft HGMP for steelhead production at Nimbus Fish Hatchery, in accordance with current NMFS guidelines, and submit that draft for NMFS review by **June 2011**. Specific actions shall include: 1) Reclamation shall fund genetic screening at Nimbus Fish Hatchery for steelhead to determine most appropriate brood stock source. This action shall be completed by **March 31, 2012**. 2) Reclamation shall fund a study examining the potential to replace the Nimbus Fish Hatchery steelhead broodstock, with genetically more appropriate sources. This action shall be completed by **March 31, 2012**	USBR	USBR	6/1/2011, 3/31/2012	Coordination is ongoing
44	NMFS	II.6.2. Interim Actions Prior to Submittal of Draft HGMP for Steelhead		Reclamation shall use its authorities to ensure that, prior to completion of the draft HGMP, the hatchery is operated according to the following protocols: 1) Release all hatchery-produced steelhead juveniles in the American River at Nimbus Fish Hatchery or at a location in the American River as close to Nimbus Fish Hatchery as is feasible to reduce straying. This action shall be implemented within 30 days of issuance of this Opinion. 2) Release all unclipped steelhead adults returning to Nimbus Fish Hatchery back into the lower American River so they can spawn naturally. This action shall be implemented within 30 days of issuance of this Opinion. 3) Stop inter-basin transfers of steelhead eggs or juveniles to other hatcheries, except upon specific written concurrence of NMFS. This action shall be implemented within 30 days of issuance of this Opinion.	USBR	USBR		Coordination is ongoing
45	NMFS	II.6.3: Develop and Implement Fall-run Chinook Salmon Hatchery Management Plans for Nimbus and Trinity River Fish Hatcheries		By **June 2014**, develop and begin implementation of Hatchery Management Plans for fall-run production at Nimbus Fish Hatchery and spring-run and fall-run at Trinity River Fish Hatchery. Reclamation shall fund CDFG to develop and submit draft plans for NMFS review by **June 2013**. The goal of the plans shall be to reduce impacts of hatchery Chinook salmon on natural fall-run and spring-run, and increase the genetic diversity and diversity of run-timing for these stocks.	USBR	USBR	6/1/2013, 6/1/2014	Coordination is ongoing
46	NMFS	III.1.1. Establish Stanislaus Operations Group for Real-Time Operational Decision-Making as Described in These Actions and Implementation Procedures		Reclamation shall create a SOG to provide a forum for real-time operational flexibility implementation of the alternative actions defined in this RPA and for clarification of decision-making processes regarding other allocations of the NMTP. This group shall include Reclamation, NMFS, USFWS, DWR, CDFG, SWRCB, and outside expertise at the discretion of NMFS and Reclamation. This group shall provide direction and oversight to ensure that the East Side Division actions are implemented, monitored for effectiveness and evaluated. Reclamation, in coordination with SOG, shall submit an annual summary of the status of these actions. See introduction to RPA for further information on group procedures.	USBR	USBR		Technical group established in October 2009
47	NMFS	III.1.2. Provide Cold Water Releases to Maintain Suitable Steelhead Temperatures		Reclamation shall manage the cold water supply within New Melones Reservoir and make cold water releases from New Melones Reservoir to provide suitable temperatures for CV steelhead rearing, spawning, egg incubation smoltification, and adult migration in the Stanislaus River downstream of Goodwin Dam in order to maintain the temperature compliance schedule. Temperature compliance shall be measured based on a seven-day average daily maximum temperature. **Exception:** If any of these criteria is or is expected to be exceeded based on a three-day average daily maximum temperature, Reclamation shall immediately notify NMFS of this condition and shall submit to NMFS a written determination that, after taking all actions within its authorities, it is unlikely to meet the above temperature requirement and the extent and duration of the expected exceedance. This determination must be supported by specific iterative modeling techniques that vary allocations and delivery schedules.	USBR	USBR		Temperature criteria @ 55 degrees at Orange Blossom Bridge and Knights Ferry. Regression equation used to manage to Knights Ferry temperature criteria.
48	NMFS	III.1.3. Operate the East Side Division Dams to Meet the Minimum Flows, as Measured at Goodwin Dam, Characterized in Figure 11-1, and as Specified in Appendix 2-E	To maintain minimum base flows to optimize CV steelhead habitat for all life history stages and to incorporate habitat maintaining geomorphic flows in a flow pattern that will provide migratory cues to smolts and facilitate out-migrant smolt movement on declining limb of pulse.	Reclamation shall operate releases from the East Side Division reservoirs to achieve a minimum flow schedule as prescribed in Appendix 2-E and generally described in figure 11-1 above. This flow schedule specifies minimum flows and does not preclude Reclamation from making higher releases for other operational criteria. When operating at higher flows than specified, Reclamation shall implement ramping rates for flow changes that will avoid stranding and other adverse effects on CV steelhead. In particular, flows that exceed 800 cfs will inundate known side channels that provide habitat, but that also pose stranding risks. When spring pulses greater than 800 cfs are identified in figure 11-1, the declining limb is not reduced below 800 cfs until the late spring flows occur.	USBR	USBR		Coordination is ongoing between USBR and NMFS on determination of year type designation.

#	BO/Take permit	Action Title	Objective	Action	Responsible Agency	Lead	Due date	Status Thru Water Year 2010
49	NMFS	Action III.2.1. Increase and Improve Quality of Spawning Habitat with Addition of 50,000 Cubic Yards of Gravel by 2014 and with a Minimum Addition of 8,000 Cubic Yards per Year for the Duration of the Project Actions		Reclamation shall minimize effects of their operations through improving spawning habitat with addition of 50,000 tons of gravel by **2014**. Reclamation shall submit a plan, including monitoring, and schedule to NMFS for gravel augmentation by **June 2010**. Reclamation shall begin gravel augmentations no later than **summer 2011**. Reclamation shall submit to NMFS a report on implementation and effectiveness of action by **2015**. Spawning gravel replenishment sites shall be monitored for geomorphic processes, material movement, and salmonid spawning use for a minimum of three years following each addition of sediment at any given site.	USBR	USBR	6/1/2010, summer 2011, 6/1/2014, 2015	Reclamation submitted plan to NMFS on 6/26/10 that included monitoring and schedule for gravel augmentation
50	NMFS	Action III.2.2. Conduct Floodplain Restoration and Inundation Flows in Winter or Spring to Inundate Steelhead Juvenile Rearing Habitat on One- to Three-Year Schedule.		Reclamation shall seek advice from SOG to develop an operational strategy to achieve floodplain inundation flows that inundate CV steelhead juvenile rearing habitat on a one- to three-year return schedule. Reclamation shall submit a proposed plan of operations to achieve this flow regime by **June 2011**. This plan shall include the minimum flow schedule identified in Action III.1.2, or shall provide justification for any proposed modification of the minimum flow schedule. NMFS will review and, if satisfactory, approve the operational strategy. Reclamation will implement strategy starting in **2012.**	USBR	USBR	6/1/2011, 2012	Coordination is ongoing.
51	NMFS	III.2.3. Restore Freshwater Migratory Habitat for Juvenile Steelhead by Implementing Projects to Increase Floodplain Connectivity and to Reduce Predation Risk During Migration	This action is necessary to compensate for continued operational effects on rearing and freshwater migratory habitat due to flood control operations. The goal of this action is to improve habitat quality of freshwater migratory habitat for juvenile steelhead.	By **June 2010**, in cooperation with the SOG, Reclamation shall develop a list of projects to improve the habitat values of freshwater migratory habitat in the Stanislaus River, and associated monitoring, for implementation and submit the list to NMFS for review. Reclamation shall begin implementation of NMFS-approved projects by **June 2011**. Reclamation shall submit a report of project implementation and effectiveness by **June 2016**. These projects may include actions that reduce exposure to predation directly, or projects that may offset predation effects by improving rearing habitat values to allow juveniles to grow larger before outmigration. These projects may include both flow- and non-flow-related actions. Flow-related actions shall be coordinated with operational flows as defined in Action III.2.2 and Action III.1.2. These projects may also include, but shall not be limited to, evaluations to identify locations or sources of higher juvenile mortality in order to identify and implement projects with the highest likelihood to prevent CV steelhead mortality.	USBR	USBR	6/1/2010, 6/1/2011, 6/1/2016	Project list coordinated with NMFS in June 2010.
52	NMFS	III.2.4. Evaluate Fish Passage at New Melones, Tulloch, and Goodwin Dams	Evaluate access for steelhead to historic cold water habitat above New Melones, Tulloch, and Goodwin dams.	See Fish Passage Program, Action V	USBR	USBR		IFPSC formed in June 2010. Habitat subgroups formed in July 2010 with emphasis on near term actions.
53	NMFS	IV.1.1 Monitoring and Alerts to Trigger Changes in DCC Operations	To provide timely information for DCC gate operation that will reduce loss of emigrating winter-run, spring-run, CV steelhead, and green sturgeon.	Monitoring of Chinook salmon migration in the Sacramento River Basin and the Delta currently occurs at the RBDD, in spring-run tributaries to the Sacramento River, on the Sacramento River at Knights Landing and Sacramento, and sites within the Delta. Reclamation and DWR shall continue to fund these ongoing monitoring programs, as well as the monitoring of salvage and loss of Chinook salmon juveniles at the Delta fish collection facilities operated by the CVP and SWP. Funding shall continue for the duration of the proposed action (2030). Reclamation and DWR may use their own fishery biologists to conduct these monitoring programs, or they may provide funds to other agencies to do the required monitoring. Monitoring protocols shall follow established procedures utilized by the USFWS, CDFG, Reclamation, and DWR. Information collected from the monitoring programs will be used to make real-time decisions regarding DCC gate operation and export pumping. The DOSS group (Action IV.5) and WOMT will use information from monitoring to make decisions regarding DCC closures consistent with procedures below. The DCC gate operati operations may need to be altered in the near future to avoid diversion of juvenile Chinook salmon migrating down the Sacramento River.	USBR/DWR	Joint	Ongoing	Coordination is ongoing; Responsibility of O&M Operations Control Office
54	NMFS	IV.1.2 DCC Gate Operation	Modify DCC gate operation to reduce direct and indirect mortality of emigrating juvenile salmonids and green sturgeon in November, December, and January.	During the period between **November 1 and June 15**, DCC gate operations will be modified from the proposed action to reduce loss of emigrating salmonids and green sturgeon. The operating criteria provide for longer periods of gate closures during the emigration season to reduce direct and indirect mortality of yearling spring-run, winter-run, and CV steelhead. From **December 1 to January 31**, the gates will remain closed, except as operations are allowed using the implementation procedures/modified Salmon Decision Tree (below).	USBR/DWR	Joint	Ongoing	Coordination is ongoing; Responsibility of O&M Operations Control Office
55	NMFS	IV.1.3 Consider Engineering Solutions to Further Reduce Diversion of Emigrating Juvenile Salmonids to the Interior and Southern Delta, and Reduce Exposure to CVP and SWP Export Facilities	Prevent emigrating salmonids from entering the Georgiana Slough channel from the Sacramento River during their downstream migration through the Delta. Prevent emigrating salmonids from entering channels in the south Delta (e.g., Old River, Turner Cut) that increase entrainment risk to CV steelhead migrating from the San Joaquin River through the Delta.	Reclamation and/or DWR shall convene a working group to consider engineering solutions to further reduce diversion of emigrating juvenile salmonids to the interior Delta and consequent exposure to CVP and SWP export facilities. The working group, comprised of representatives from Reclamation, DWR, NMFS, USFWS, and CDFG, shall develop and evaluate proposed designs for their effectiveness. in reducing adverse impacts on listed fish and their critical habitat. Reclamation or DWR shall subject any proposed engineering solutions to external independent peer review and report the initial findings to NMFS by **March 30, 2012**. Reclamation or DWR shall provide a final report on recommended approaches by **March 30, 2015**. If NMFS approves an approach in the report, Reclamation or DWR shall implement it. To avoid duplication of efforts or conflicting solutions, this action should be coordinated with USFWS' Delta smelt biological opinion and BDCP's consideration of conveyance alternatives.	USBR/DWR	DWR	3/30/2012, 3/30/2015	Coordination is ongoing.

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56	NMFS	IV.2.1 San Joaquin River Inflow to Export Ratio	To reduce the vulnerability of emigrating CV steelhead within the lower San Joaquin River to entrainment into the channels of the South Delta and at the pumps due to the diversion of water by the export facilities in the South Delta, by increasing the inflow to export ratio. To enhance the likelihood of salmonids successfully exiting the Delta at Chipps Island by creating more suitable hydraulic conditions in the main stem of the San Joaquin River for emigrating fish, including greater net downstream flows.	Phase I: Interim Operations in 2010-2011. From **April 1 through May 31**: 1. Flows at Vernalis (7-day running average shall not be less than 7 percent of the target requirement) shall be based on the New Melones Index32. In addition to the Goodwin flow schedule for the Stanislaus River prescribed in Action III.1.3 and Appendix 2-E, Reclamation shall increase its releases at Goodwin Reservoir, if necessary, in order to meet the flows required at Vernalis, as provided in the following table. NMFS expects that tributary contributions of water from the Tuolumne and Merced rivers, through the SJRA, will continue through **2011** and that the installation of a fish barrier at the Head of Old River will continue to occur during this period as permitted . 2. Combined CVP and SWP exports shall be restricted through the following. In addition: 1) Reclamation/DWR shall seek supplemental agreement with the SJRGA as soon as possible to achieve minimum long term flows at Vernalis (see following table) through all existing authorities. Phase II: Beginning in **2012: From April 1 thr** DWR shall implement the Vernalis flow-to-combined export ratios in the following table, based on a 14-day running average Exception procedure for multiple dry years: If the previous 2 years plus current year of San Joaquin Valley "60-20-20" Water Year Hydrologic Classification and Indicator as defined in D-1641 and provided in following table, is 6 or less, AND the New Melones Index is less than 1 MAF, exports shall be limited to a 1:1 ratio with San Joaquin River inflow, as measured at Vernalis.	USBR/DWR	Joint	Annually	Coordination in ongoing; Link to BDO is installation of Temporary Barriers. Responsibility for implementation fo flow and export req's may fall to O&M Operations Control Office (under VAMP).
57	NMFS	IV.2.2 Six-Year Acoustic Tag Experiment	To confirm proportional causes of mortality due to flows, exports and other project and non-project adverse effects on steelhead smolts out-migrating from the San Joaquin basin and through the southern Delta.	Reclamation and DWR shall fund a 6-year research-oriented action concurrent with Action IV.2.1. The research shall be composed of studies utilizing acoustically-tagged salmonids, and will be implemented to assess the behavior and movement of the outmigrating fish in the lower San Joaquin River. The studies will include three releases of acoustic tagged fish, timed to coincide with different periods and operations: March 1 through March **31, April 1 through May 31, and June 1 through June 15**. NMFS anticipates that studies will utilize clipped hatchery steelhead and hatchery fall-run as test fish. During the period from **March 1 through March 30**, the exports will be operated in accordance with the requirements dictated by action IV.2.3. During the 60-day period between **April 1 and May 30**, exports will be dictated by the requirements of action IV.2.1. Reclamation shall operate to a minimum 1:1 inflow to export ratio during the period between **June 1 and June 15**, allowing exports to vary in relation to inflows from the San Joaquin to test varying flow to export ratios during this period. If daily water temperatures at Mossdale exceed 72°F for seven consecutive days during the period between **June 1 and June 15**, then the inflow to export ratio may be relaxed. NMFS anticipates that warm water conditions in the lower San Joaquin River will not be suitable for steelhead under these conditions.	USBR/DWR	Joint		Pending coordination with NMFS on sepcifics of this Action. High importance based on peer review panel reaction during VAMP presentation (Jeff Stuart). A letter documenting the verbal agreement that this year'ss VAMP was acceptable to NMFS as the 6-year study is being developed is pending. A second year of VAMP in lieu of the study is forseeable.
58	NMFS	IV.2.3 Old and Middle River Flow Management	Reduce the vulnerability of emigrating juvenile winter-run, yearling spring-run, and CV steelhead within the lower Sacramento and San Joaquin rivers to entrainment into the channels of the South Delta and at the pumps due to the diversion of water by the export facilities in the South Delta. Enhance the likelihood of salmonids successfully exiting the Delta at Chipps Island by creating more suitable hydraulic conditions in the mainstem of the San Joaquin River for emigrating fish, including greater net downstream flows.	From **January 1 through June 15**, reduce exports, as necessary, to limit negative flows to -2,500 to -5,000 cfs in Old and Middle Rivers, depending on the presence of salmonids. The reverse flow will be managed within this range to reduce flows toward the pumps during periods of increased salmonid presence.	USBR/DWR	Joint	Annually	Coordination is ongoing; DWR and USBR developing methodology for dealing with transitions in operations after changes in OMR flow requirements.
59	NMFS	IV.3 Reduce Likelihood of Entrainment or Salvage at the Export Facilities	Reduce losses of winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon by reducing exports when large numbers of juvenile Chinook salmon are migrating into the upper Delta region, at risk of entrainment into the central and south Delta and then to the export pumps in the following weeks.	From **November 1 through April 30**, operations of the Tracy and Skinner Fish Collection Facilities shall be modified according to monitoring data from upstream of the Delta. In conjunction with the two alerts for closure of the DCC (Action IV.1.1), the Third Alert shall be used to signal that export operations may need to be altered in the near future due to large numbers of juvenile Chinook salmon migrating into the upper Delta region, increasing their risk of entrainment into the central and south Delta and then to the export pumps. Third Alert: The catch index is greater than 10 fish captured per day from **November 1 to February 28**, or greater than 15 fish captured per day from **March 1 to April 30**, from either the Knights Landing catch index or the Sacramento catch index.	USBR/DWR	Joint	Annually	Coordination is ongoing.

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60	NMFS	**Action Suite IV.4 Modifications of the Operations and Infrastructure of the CVP and SWP Fish Collection Facilities**	Achieve 75 percent performance goal for whole facility salvage at both state and Federal facilities. Increase the efficiency of the Tracy and Skinner Fish Collection Facilities to improve the overall salvage survival of winter-run, spring-run, CV steelhead, and green sturgeon.	Reclamation and DWR shall each achieve a whole facility salvage efficiency of 75 percent at their respective fish collection facilities. Reclamation and DWR shall implement the following actions to reduce losses associated with the salvage process, including: (1) conduct studies to evaluate current operations and salvage criteria to reduce take associated with salvage, (2) develop new procedures and modifications to improve the current operations, and (3) implement changes to the physical infrastructure of the facilities where information indicates such changes need to be made. Reclamation shall continue to fund and implement the CVPIA Tracy Fish Facility Program. In addition, Reclamation and DWR shall fund quality control and quality assurance programs, genetic analysis, louver cleaning loss studies, release site studies and predation studies. Funding shall also include new studies to estimate green sturgeon screening efficiency at both facilities and survival through the trucking and handling process.	USBR/DWR		Annually	Coordination is ongoing.
61	NMFS	IV.4.1 Tracy Fish Collection Facility (TFCF) Improvements to Reduce Pre-Screen Loss and Improve Screening Efficiency	Implement specific measures to reduce pre-screen loss and improve screening efficiency at Federal facilities.	Reclamation shall undertake actions at the TFCF to reduce pre-screen loss and improve screening efficiency.	USBR	USBR	1/2/2010	Actions to improve screening efficiency undertaken in January 2010.
62	NMFS	IV.4.2 Skinner Fish Collection Facility Improvements to Reduce Pre-Screen Loss and Improve Screening Efficiency	Implement specific measures to reduce pre-screen loss and improve screening efficiency at state facilities.	DWR shall undertake the following actions at the Skinner Fish Collection Facility: 1) By **December 31, 2012**, operate the whole Skinner Fish Protection Facility to achieve a minimum 75 percent salvage efficiency for CV salmon, steelhead, and Southern DPS of green sturgeon after fish enter the primary channels in front of the louvers. 2) Immediately commence studies to develop predator control methods for Clifton Court Forebay that will reduce salmon and steelhead pre-screen loss in Clifton Court Forebay to no more than 40 percent. a) On or before **March 31, 2011**, improved predator control methods. Full compliance shall be achieved by **March 31, 2014**. Failure to meet this timeline shall result in the cessation of incidental take exemption at SWP facilities unless NMFS agrees to an extended timeline. b) DWR may petition the Fish and Game Commission to increase bag limits on striped bass caught in Clifton Court Forebay. 3) Remove predators in the secondary channel at least once per week.	DWR	DWR	Immediately, 3/31/2011, 12/31/2012, 3/31/2014	Under development by Fishery Improvement staff and included for funding under the Fishery Improvement Charter.
63	NMFS	IV.4.3 Tracy Fish Collection Facility and the Skinner Fish Collection Facility Actions to Improve Salvage Monitoring, Reporting and Release Survival Rates	To improve overall survival of listed species at facilities through accurate, rapid salvage reporting and state-of-the-art salvage release procedures. This reporting is also necessary to provide information needed to trigger OMR actions.	Reclamation and DWR shall undertake the following actions at the TFCF and the Skinner Fish Collection Facility, respectively. Actions shall commence by **October 1, 2009**, unless stated otherwise. 1) Sampling rates at the facilities for fish salvage counts shall be no less than 30 minutes every 2 hours (25 percent of operational time) year-round to increase the accuracy of salvage estimates used in the determination of trigger levels. Exceptions to the 30-minute count may occur with NMFS' concurrence under unusual situations, such as high fish densities or excessive debris loading. 2) By **October 1, 2010**, websites shall be created or improved to make salvage count data publicly available within 2 days of observations of the counts. 3) Release Site Studies shall be conducted to develop methods to reduce predation at the "end of the pipe" following release of salvaged fish. 4) By **June 15, 2011**, predation reduction methods shall be implemented according to analysis in 3. By **June 15, 2014**, achieve a predation rate that has been reduced 50 percent from current rate. 5) Add salt to water within the tanker trucks hauling fish to reduce stress of transport. Assess use of other means to reduce stress, protect mucous slime coat on fish, and prevent infections from abrasions (i.e., commercially available products for this purpose). 6) All personnel conducting fish counts must be trained in juvenile fish identification and have working knowledge of fish physiology and biology. 7) Tanker truck runs to release salmonids should be scheduled at least every 12 hours, or more frequently if required by the "Bates Table" calculations (made at each count and recorded on the monthly report). 8) Reclamation and DWR shall use the Bates Table to maintain suitable environmental conditions for fish in hauling trucks. Trucks should never be overcrowded so that the carrying capacity of the tanker truck is exceeded.	USBR/DWR	USBR	Immediately, 10/1/2009, 10/1/2010, 6/15/2011, 6/15/2014	In regards to DWR's responsibility: This action is primarily responsibility of Delta Field Division and many items already addressed. Link to BDO is IV.4.2 to ensure coordination.
64	NMFS	IV.5 Formation of Delta Operations for Salmon and Sturgeon (DOSS) Technical Working Group	Create a technical advisory team .that will provide recommendations to WOMT and NMFS on measures to reduce adverse effects of Delta operations of the CVP and SWP to salmonids and green sturgeon and will coordinate the work of the other technical teams	The DOSS group will be comprised of biologists, hydrologists, and other staff with relevant expertise from Reclamation, DWR, CDFG, USFWS, and NMFS. Invitations to EPA, USGS, and Regional Water Quality Board biologists will be extended to provide expertise on issues pertinent to Delta water quality, hydrology and environmental parameters. By **October 1, 2009,** Reclamation shall, jointly with NMFS, convene the DOSS working group.	USBR/DWR/ NMFS	USBR	10/1/2009, summary every 5 years	Techncial group established in Oct 2009

#	BO/Take permit	Action Title	Objective	Action	Responsible Agency	Lead	Due date	Status Thru Water Year 2010
65	NMFS	IV.6 South Delta Improvement Program—Phase I (Permanent Operable Gates)		DWR shall not implement the South Delta Improvement Program, which is a proposal to replace temporary barriers with permanent operable gates.	DWR	DWR	Immediately	Handled by South Delta staff under Mark Holderman.
66	NMFS	NF 1. Formation of Interagency Fish Passage Steering Committee	To charter, and support through funding agreements, an interagency steering committee to provide oversight and technical, management, and policy direction for the Fish Passage Program.	By **December 2009,** Reclamation shall establish, chair and staff the Interagency Fish Passage Steering Committee. The Committee shall be established in consultation with and the approval of NMFS and shall include senior biologists and engineers with experience and expertise in fish passage design and operation, from Reclamation, NMFS, DWR, CDFG, and USFWS. The Steering Committee also shall include academic support by including at least one academic member from a California University with and established fishery program. The committee shall be limited to agency membership unless otherwise approved by Reclamation and NMFS. Steering committee membership shall include on lead member and one alternate.	USBR/DWR	USBR	12/1/2009	IFPSC formed in June 2010. Habitat subgroups formed in July 2010 with emphasis on near term actions.
67	NMFS	NF 2. Evaluation of Salmonid Spawning and Rearing Habitat Above Dams	To quantify and characterize the location, amount, suitability, and functionality of existing and/or potential spawning and rearing habitat for listed species above dams operated by Reclamation.	Beginning in **January 2010 and continuing through January 2012**, Reclamation, shall conduct habitat evaluations to quantify and characterize the location, amount, suitability, and functionality of existing and/or potential spawning and rearing habitat for listed species above the project reservoirs. Reclamation shall obtain the Steering Committee's assistance in designing and implementing the habitat evaluations. Evaluations shall be conducted using established field survey protocols such as the USFS Region 5 Stream Condition Inventory, Field Intensive and Field Extensive protocols; and habitat models including the Salmon Habitat Integrated Resource Analysis (Shiraz) in combination with the Distributed Hydrology Soil Vegetated Model (DHSVM) or RIPPLE. Shiraz is a life-cycle model that incorporates stream flow and temperature inputs from DHSVM to develop future projections of salmon population sizes. Ripple uses digital terrain information with aquatic habitat and biological data to identify habitat limitations that affect salmon production.	USBR/DWR	USBR	1/2010-1/2012	IFPSC formed in June 2010. Habitat subgroups formed in July 2010 with emphasis on near term actions.
68	NMFS	NF 3. Development of Fish Passage Pilot Plan		From **January 2010 through January, 2011**, Reclamation, with assistance from the Steering Committee, shall complete a 3-year plan for the Fish Passage Pilot program.	USBR/DWR	USBR	1/2010-1/2011	NMFS is clarifying goal of piolt plan; DWR developing white paper on technologies being used or planned for upstream, through reservoir, and downstream fish passage at large dams.
69	NMFS	NF 4. Implementation of Pilot Reintroduction Program	To implement short-term fish passage actions that will inform the planning for long-term passage actions.	From **January 2012 through 2015**, Reclamation shall begin to implement the Pilot Reintroduction Program (see specific actions below). The Pilot Program will, in a phased approach, provide for pilot reintroduction of winter-run and spring-run to habitat above Shasta Dam in the Sacramento River, and CV steelhead above Folsom Dam in the American River. This interim program will be scalable depending on source population abundance, and will not impede the future installation of permanent facilities, which require less oversight and could be more beneficial to fish. This program is not intended to achieve passage of all anadromous fish that arrive at collection points, but rather to phase in passage as experience with the passage facilities and their benefits is gained.	USBR	USBR	1/2012-1/2015	Coordination is ongoing
70	NMFS	NF 4.1. Adult Fish Collection and Handling Facilities		Beginning in **2012**, Reclamation, with assistance from the Steering Committee, shall design, construct, install, operate and maintain new or rebuilt adult fish collection, handling and transport facilities at the sites listed below. The objective is to provide interim facilities to pass fish above project facilities and reservoirs. Reclamation and partner agencies shall incorporate NMFS' Fish Screening Criteria for Anadromous Salmonids (NMFS 1997a) and the best available technology. During the design phase, Reclamation and partner agencies shall coordinate with NMFS to determine if the design should accommodate possible later connection to improved facilities, if necessary in years beyond 2015. Reclamation and partner agencies shall complete all interim steps in a timely fashion to allow them to meet the following deadlines for completing construction and beginning operation of the facilities listed below. These steps may include completing plans and specifications. Reclamation and partner agencies shall give NMFS periodic updates on their progress. The order in which these facilities are completed may be modified with NMFS' concurrence, based on interim analyses and biological priorities. 1) Sacramento River Fish Facility – Collection facility shall be operational no later than **March 2012**. 2) American River Fish Facility – Collection facility shall be operational no later than **March 2012.**	USBR/DWR	USBR	3/1/2012	Coordination is ongoing
71	NMFS	NF 4.2. Adult Fish Release Sites above Dams and Juvenile Fish Sites Below Dams		Reclamation shall provide for the safe, effective, and timely release of adult fish above dams and juvenile fish below dams. The Fish Passage Plan must identify and release sites. Fish transport and release locations and methods shall follow existing State and Federal protocols. With assistance from the Steering Committee, and in coordination with applicable landowners and stakeholders, Reclamation shall complete construction of all selected sites by **March 2012**.	USBR	USBR	3/1/2012	Coordination is ongoing

#	BO/Take permit	Action Title	Objective	Action	Responsible Agency	Lead	Due date	Status Thru Water Year 2010
72	NMFS	NF 4.3. Capture, Trapping, and Relocation of Adults		By **March 2012**, Reclamation shall implement upstream fish passage for adults via "trap and transport" facilities while it conducts studies to develop and assess long-term upstream and downstream volitional fish passage alternatives. At least one fish facility must be in place at terminal upstream passage points for each river that is subject to this measure. Facilities to capture adults currently exist at or below Keswick and Nimbus Dams, though these may need to be upgraded. The Pilot Program is a first step in providing anadromous fish passage to historical habitat above Project dams but will not be sufficient by itself. The number of fish that shall be relocated is expected to vary depending on the source population, source population size, and the results of fish habitat evaluations and modeling of carrying and production capacity.	USBR	USBR	3/1/2012	Coordination is ongoing
73	NMFS	NF 4.4. Interim Downstream Fish Passage through Reservoirs and Dams		Beginning in **2012**, following the emergence of the first year class of reintroduced fish, and until permanent downstream passage facilities are constructed or operations are established at Project dams, Reclamation shall carry out interim operational measures to pass downstream migrants as safely and efficiently as possible through or around Project reservoirs and dams under current dam configurations and physical and operational constraints, consistent with authorized Project purposes. Near-term operating alternatives shall be identified, evaluated, and implemented if determined to be technically and economically feasible and biologically justified by Reclamation and partner agencies, within the framework of the Annual Operating Plan updates and revisions, and in coordination with the Fish Passage Plan Steering Committee. Interim devices shall be constructed to collect emigrating juvenile salmonids and emigrating post-spawn adult steelhead from tributaries, main stems above project reservoirs, or heads of reservoirs	USBR	USBR	4/30/2011	Coordination is ongoing
74	NMFS	NF 4.5. Juvenile Fish Collection Prototype	To determine whether the concept of a head-of-reservoir juvenile collection facility is feasible, and if so, to use head-of-reservoir facilities in Project reservoirs to increase downstream fish survival. Safe and timely downstream passage of juvenile Chinook salmon and juvenile and adult post-spawn steelhead is a critical component to the success of the Fish Passage Program.	Beginning in **January, 2010**, with input from the CVP/SWP operations Fish Passage Steering Committee, Reclamation shall plan, design, build, and evaluate a prototype head-of-reservoir juvenile collection facility above Shasta Dam. Construction shall be complete by **September 2013**. Because the head-of-reservoir fish collection concept is virtually untested, it would be imprudent to require such facilities without prior field studies, design, and prototype testing to validate the concept. For this measure, NMFS defines "prototype" to refer to temporary facilities intended for concept evaluation, not long-term operations. Further, "prototype" does not necessarily refer to a single concept; multiple concepts may be tested simultaneously. Possible options include, among others: (1) floating collectors in the reservoir near the mouths of tributaries, (2) use of curtained or hardened structures near mouths of tributaries, that block surface passage into reservoirs, (3) fish collection facilities on tributaries above the reservoir pools, and (4) a combination of the above to maximize collection in high flow and low flow conditions.	USBR/DWR	USBR	1/2010, 9/2013, 6/2016, 12/31/2016	IFPSC formed in June 2010. Habitat subgroups formed in July 2010 with emphasis on near term actions.
75	NMFS	NF 4.6. Pilot Program Effectiveness Monitoring and Evaluation		From **2012 to 2015**, Reclamation shall study, and provide annual reports on, the elements of the pilot program, including adult reintroduction locations, techniques, survival, distribution, spawning, and production; and juvenile rearing, migration, recollection, and survival. The objective is to gather sufficient biological and technical information to assess the relative effectiveness of the program elements and determine the feasibility of long-term passage alternatives. A final summary report of the 5-year pilot effort shall be completed by **December 31, 2015**.	USBR	USBR	2012-2015, 12/31/2015	Coordination is ongoing
76	NMFS	NF 4.7. Stanislaus River Fish Passage Assessment	To develop information needed in order to evaluate options for achieving fish passage on the Stanislaus River above Goodwin, Tulloch, and New Melones Dams.	By **March 31, 2011**, Reclamation shall develop a plan to obtain information needed to evaluate options for fish passage on the Stanislaus River above Goodwin, Tulloch and New Melones Dams and shall submit this plan to NMFS for review. This plan shall identify reconnaissance level assessments that are needed to support a technical evaluation of the potential benefits to CV steelhead that could be achieved with passage above the dams, a general assessment of logistical and engineering information needed, and a schedule for completing those assessments by **December 31, 2016.**	USBR	USBR	3/31/2011, 12/31/2016	Coordination is ongoing
77	NMFS	NF 5. Comprehensive Fish Passage Report	To evaluate the effectiveness of fish passage alternatives and make recommendations for the development and implementation of long-term passage alternatives and a long-term fish passage program.	By **December 31, 2016**, Reclamation shall prepare a Comprehensive Fish Passage Report. The Report shall include preliminary determinations by Reclamation and partner agencies regarding the feasibility of fish passage and other related structural and operational alternatives. The report should include specific recommendations for improvements to highest priority sub-basins and/or features and to include recommendations for major operational changes. It will also include identification and evaluation of high priority actions and may suggest modifying the scope or timelines of these high priority actions, based on the predicted outcome of long-term efforts.	USBR	USBR	12/31/2016	Coordination is ongoing
78	NMFS	LF 1. Long-term Funding and Support to the Interagency Fish Passage Steering Committee		If the Comprehensive Fish Passage Report indicates that long-term fish passage is feasible and desirable, Reclamation shall continue to convene, fund, and staff the Fish Passage Steering Committee.	USBR	USBR	after 2016	Coordination is ongoing

#	BO/Take permit	Action Title	Objective	Action	Responsible Agency	Lead	Due date	Status Thru Water Year 2010
79	NMFS	LF 2. Action Suite: Long-Term Fish Passage Plan and Program	Provide structural and operational modifications to allow safe fish passage and access to habitat above and below Project dams in the Central Valley.	Based on the results of the Comprehensive Fish Passage Report, Reclamation, with assistance from the Steering Committee, shall develop a Long-term Fish Passage Plan and implement a Long-term Fish Passage Program. Reclamation and partner agencies shall submit a plan to NMFS on or before **December 31, 2016**, which shall describe planned long-term upstream and downstream fish passage facilities and operations, based on the best available information at that time. The plan shall include a schedule for implementing a long-term program for safe, timely, and effective anadromous fish passage by **January 31, 2020**.	USBR	USBR	12/31/2016, 1/31/2020	Coordination is ongoing
80	NMFS	LF 2.1. Long-term Adult and Juvenile Fish Passage Facilities		Based on the results of the Comprehensive Fish Passage Report and the Fish Passage Plan, and with the assistance of the Steering Committee, Reclamation shall construct long-term fish passage facilities necessary to successfully allow upstream and downstream migration of fish around or through project dams and reservoirs on the Sacramento and American Rivers by **2020**, and Stanislaus River depending on results of study provided for in Action NF 4.7.	USBR	USBR	2020	Coordination is ongoing
81	NMFS	LF 2.2. Supplementation and Management Plan		Based on the results of the Comprehensive Fish Passage Report and the Fish Passage Plan, and with the assistance of the Steering Committee, in consultation with the NMFS Southwest Fishery Science Center, Reclamation shall develop and implement a long-term population supplementation plan for each species and fish passage location identified in V. Fish Passage Program, with adult recruitment and collection criteria developed with consideration for source population location, genetic and life history diversity, abundance and production. The purpose is to ensure that long-term abundance and viability criteria are met for all reintroduced populations, with contingencies for supplementing populations with wild and/or conservation hatchery fish if necessary. The plan shall be developed by **2020**. The plan shall identify wild and/or hatchery sources for adult reintroductions and long-term supplementation, and the specific NMFS-approved hatchery management practices that qualify a hatchery for conservation purposes. Species-specific conservation hatchery programs may be developed to supplement reintroductions and maintain long-term performance standards for abundance and viability.	USBR/NMFS		2020	Coordination is ongoing
82	NMFS	LF 2.3. Long-term Fish Passage Monitoring and Evaluation		Reclamation, through the Steering Committee shall develop a Long-term Fish Passage Monitoring and Evaluation Plan by **2020**, to monitor all elements of the Long-term Fish Passage Program including adult reintroduction locations, techniques, survival, distribution, spawning, and production; and juvenile rearing, migration, recollection, and survival. The objective is to gather sufficient biological and technical information to assess the relative effectiveness of the program elements and determine the feasibility of long-term passage alternatives. Annual reports shall be submitted to NMFS by **September 30** of each year.	USBR	USBR	Annual reports due 9/30	Coordination is ongoing
83	FWS	7.1 Inter-tidal/sub-tidal habitat management		Acquisition, initial enhancement, restoration, long-term management and long-term monitoring of 800 acres of inter-tidal and associated sub-tidal wetland habitat		DWR	Acquisition and restoration palnning 160 acres: 2/23/2011, Restoration of 160 acres: every 2 years, completed by 2019	
84	FWS	8.3 Reporting of salvage info @ Skinner		Annual report to DFG with information on salvage at Skinner including daily OMR flows and daily salvage		DWR	Report for the WY due by December 1 of each year starting in 2010	
85	FWS	8.4 Develop fish screen monitoring program @ Sherman Island		Develop and implement a performance monitoring program for the fish screens at NBA, RRDS and Sherman Island to ensure the minimizations measures required by the permit are successfully reducing incidental take of LFS. Also, consult with DFG on improvements to RRDS screen.		DWR	Draft plan due 5/23/2009	
86	FWS	9.2 Funding for required mitigation		Provide funding assurance for required mitigation		DWR	20% of funding provided by 5/23/2009, Additional 20% payment provided at years 2,4,6, and 8	